

What is Claimed is:

1. A method of fabricating a silicon carbide imprint stamp, comprising:

patterning a mold layer;

etching the mold layer to form a cavity in the mold layer, the cavity including a first feature size that is greater than or equal to a lithography limit;

depositing a spacer layer on the mold layer, the spacer layer conformally covering a surface of the cavity;

forming a spacer in the cavity by anisotropically etching the spacer layer so that the spacer is connected with a portion of the surface of the cavity and the spacer partially fills the cavity so that the cavity includes a second feature size that is less than the lithography limit;

depositing a material comprising silicon carbide in the cavity and on the spacer to form a feature positioned in the cavity and a foundation layer connected with the feature and at least a portion of the feature includes the second feature size;

planarizing the foundation layer to form a substantially planar surface;

bonding a handling substrate with the foundation layer by applying heat and pressure to the handling substrate and the mold layer until the handling substrate and the foundation layer form a mechanical bond with each other; and

extracting the silicon carbide imprint stamp by releasing the feature and the foundation layer from the mold layer.

2. The method as set forth in Claim 1, wherein the releasing comprises a grinding a backside surface of the mold layer until the mold layer is released from the feature and the foundation layer.
3. The method as set forth in Claim 2, wherein the grinding comprises a chemical mechanical planarization process.
4. The method as set forth in Claim 2 and further comprising:
 - etching a remainder of the mold layer and the spacer to effectuate the releasing of the feature and the foundation layer.
5. The method as set forth in Claim 1, wherein the surface of the cavity includes a bottom surface and a sidewall surface and the spacer is connected with the sidewall surface of the cavity.
6. The method as set forth in Claim 1 and further comprising:
 - after the extracting, forming a master imprint stamp by mounting a plurality of the silicon carbide imprint stamps to a master substrate.
7. The method as set forth in Claim 6 and further comprising:
 - positioning a plurality of the silicon carbide imprint stamps in an array of rows and columns on the master substrate.
8. The method as set forth in Claim 1, wherein the forming the spacer comprises a reactive ion etching of the spacer layer.
9. The method as set forth in Claim 1, wherein the etching the mold layer comprises an anisotropic reactive ion etching of the mold layer to form the cavity.

10. A method of fabricating a silicon carbide imprint stamp, comprising:

patterning a mold layer;

etching the mold layer to form a cavity in the mold layer, the cavity including a first feature size that is greater than or equal to a lithography limit;

depositing a spacer layer on the mold layer, the spacer layer conformally covering a surface of the cavity;

forming a spacer in the cavity by anisotropically etching the spacer layer so that the spacer is connected with a portion of the surface of the cavity and the spacer partially fills the cavity so that the cavity includes a second feature size that is less than the lithography limit;

depositing a material comprising silicon carbide in the cavity and on the spacer to form a feature positioned in the cavity and a foundation layer connected with the feature and at least a portion of the feature includes the second feature size;

planarizing the foundation layer to form a substantially planar surface;

depositing a glue layer on the substantially planar surface of the foundation layer;

bonding a handling substrate with the glue layer by applying pressure and heat to the handling substrate and the mold layer until the glue layer forms a mechanical bond with the foundation layer and the handling substrate; and

extracting the silicon carbide imprint stamp by releasing the feature and the foundation layer from the mold layer.

11. The method as set forth in Claim 10, wherein the releasing comprises a grinding a backside surface of the mold layer until the mold layer is released from the feature and the foundation layer.

12. The method as set forth in Claim 11, wherein the grinding comprises a chemical mechanical planarization process.

13. The method as set forth in Claim 11 and further comprising:

etching a remainder of the mold layer and the spacer to effectuate the releasing of the feature and the foundation layer.

14. The method as set forth in Claim 10, wherein the surface of the cavity includes a bottom surface and a sidewall surface and the spacer is connected with the sidewall surface of the cavity.

15. The method as set forth in Claim 10 and further comprising:

after the extracting, forming a master imprint stamp by mounting a plurality of the silicon carbide imprint stamps to a master substrate.

16. The method as set forth in Claim 15 and further comprising:

positioning a plurality of the silicon carbide imprint stamps in an array of rows and columns on the master substrate.

17. The method as set forth in Claim 10, wherein the forming the spacer comprises a reactive ion etching of the spacer layer.

18. The method as set forth in Claim 10, wherein the etching the mold layer comprises an anisotropic reactive ion etching of the mold layer to form the cavity.